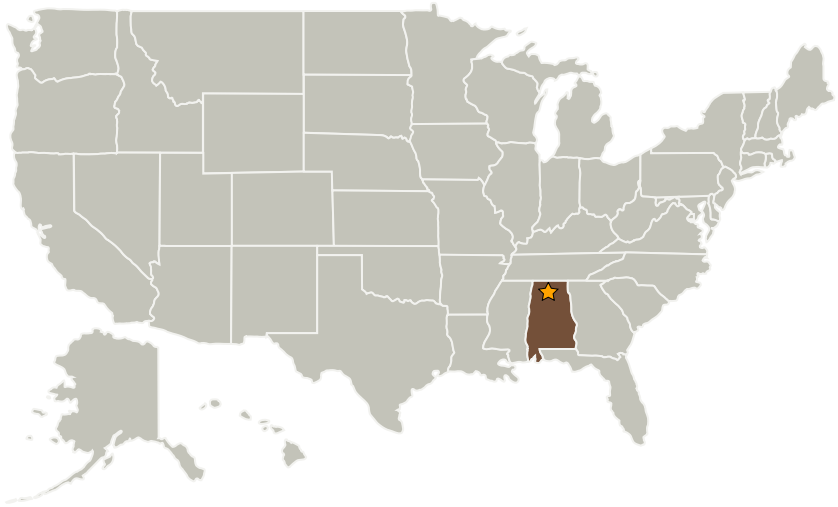
Radiation Shielding Using Thermally Insulating Spheres, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

The design of future habitation structures and exploration vehicles will require a higher level of crew protection from dangerous solar particle events (SPE) and galactic cosmic rays (GCR) than is currently provided for operations in low Earth orbit (LEO). The incorporation of radiation shielding technology into sub-system elements will be crucial to the success of future designs. One area where radiation shielding may be incorporated is in thermal insulation materials. The design of habitation structures and exploration vehicles will require extensive thermal protection. Combining the roles of radiation shielding and thermal insulation may be possible by using millimeter sized spheres in place of multi-layer insulation (MLI). By manufacturing the spheres from materials known to provide radiation shielding, the complexity of a vehicle or habitation structure can be reduced. An additional benefit of using spheres as insulation is the ability to operate in a weak vacuum such as the Mars atmosphere. Thus, a sphere insulation design could also be used in the ultra-low pressure gas environment of Mars. This project will involve the research and evaluation of materials most suitable for radiation shielding and thermal performance evaluation testing of multiple sample sizes in both vacuum and low pressure gas environments.

Primary U.S. Work Locations and Key Partners



Radiation Shielding Using Thermally Insulating Spheres, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Radiation Shielding Using Thermally Insulating Spheres, Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Tec-Masters, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB), Historically Underutilized Business Zones (HUBZones)	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Richard D Horton

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.3 Protection Systems